

Global Warming: FACTS & SOLUTIONS



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Global Warming Is Here: The Scientific Evidence

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A worldwide wave of extreme weather inflicted at least \$90 billion in damage in 1998, more than in the entire 1980s. Last year was also the hottest on record. While no single weather event or year proves humans are warming the planet, a powerful scientific case is building. Some of the most compelling evidence emerged in just the past year.

Greenhouse gases are present in the atmosphere in greater amounts than at any time in at least 220,000 years. Certainly something is heating the globe. The century's ten warmest years have all occurred since 1983, seven in this decade. A new National Science Foundation study based on natural indicators such as tree rings, ice-cores and corals finds the last decade of the millennium has been its hottest. And 1998 was by far the hottest year. Temperatures surged faster than previously documented to break a record set just in 1997.

Middle and lower latitude mountain glaciers are showing the effects. University of Colorado glaciologists at Boulder in 1998 reported that those glaciers have retreated on average at least 60 feet since 1961, and the rate at which they are melting is increasing. The retreat of mountain ice in tropical and subtropical latitudes provides "some of the most compelling evidence yet for recent global warming," Ohio State University researchers note.

A new study by NASA's Goddard Institute found Greenland glaciers appear to be spewing icebergs into the ocean faster than in the past. The finding was unexpected, and raises fears that global sea levels, already projected to rise 20 inches next century, could increase even faster.

Predictions that global warming will be greatest in the polar regions are now being borne out. Arctic sea ice has been shrinking by three percent each decade since 1970. Several of the years with the smallest sea ice coverage were in the 1990s. Around the Antarctic Peninsula, extensive sea ice formed four winters out of every five in the mid-century. Since the 1970s, that dropped to one to two winters out of five.

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Several Peninsula ice shelves, which attach to the continent but stretch into the sea, are in retreat. Some of the most dramatic losses came in 1998, when around 2,000 square miles calved into icebergs. The loss in one year equaled the average of 10-15 years. The Larsen A ice shelf, after years of slowly melting away, suddenly disintegrated in 1995. Scientists have now mounted a death watch for Larsen B and Wilkens, together three times larger than Delaware.

Since ice shelves already displace water, the loss will not add to rising ocean levels. But melting northern tundra could have a devastating global effect. Carbon in tundra soils, equal to one-third that in the atmosphere could be released.

Tundra researcher George W. Kling of the University of Michigan says, "Our latest data show that the Arctic is no longer a strong sink for carbon. In some years, the tundra is adding as much or more carbon to the atmosphere than it removes.

A warmer atmosphere is expected to cause more evaporation, making for worse droughts and more deluges. Beginning around 1980, sections of the United States, Europe, Africa, and Asia did begin to experience more dry spells, while parts of the U.S. and Europe have become much wetter.

The National Climatic Data Center (NCDC) scrutinized U.S. weather records for extremes expected to increase under global warming. NCDC discovered that wild weather has been surging since the late 1970s. Statistical analysis showed only 1-in-20 odds that these extremes were a natural fluctuation. NCDC Chief Scientist Tom Karl commented, "I would say the climate is responding to greenhouse gases."

Thick, precipitation-prone clouds significantly increased over Australia, Europe and the United States between 1951 and 1981. Researchers concluded the increase is "likely to be related" to human-caused greenhouse gases.

Cloud cover holds in heat after the sun goes down. So nighttime warming is a significant global warming indicator. Nighttime temperatures are going up more than twice as fast as daytime temperatures. Extreme summer heatwaves in the U.S. increased 88 percent between 1949-95, with the biggest heat increases coming at night.

Warming is having devastating impacts on plants and animals. Coral reefs, the "rainforests of the ocean" where one-quarter of all marine species are found, suffered record die-off due to heat-induced bleaching in 1998.

"At this time, it appears that only...global warming could have induced such extensive bleaching simultaneously throughout the disparate reef regions of the world," a State Department scientific report concluded.

A dramatic temperature increase off North America's west coast began around 1977. Zooplankton, the microscopic plant-eaters that form the base of the marine food chain, dropped 70 percent because warmer waters suppressed colder, nutrient-rich currents. Indicating food chain collapse, ocean seabirds in the California Current have declined 90 percent since 1987.

As the Pacific has warmed, so has Alaska. On the south central coast, cool temperatures normally keep the spruce bark beetle under control. But with the warming the beetles have killed most trees over three million acres, one of the largest insect-caused forest deaths in North American history.

Evidence is mounting that global warming is here and humanity is driving it. Remaining scientific uncertainty "does not justify inaction in the mitigation of human-induced climate change and/or the adaptation to it," the American Geophysical Union said in a recent statement.

The emerging scientific consensus leaves us with no excuses. We must rapidly transition from fossil fuels to clean energy. The global climate crisis, perhaps the greatest challenge in the history of civilization, calls upon us to act decisively and without delay.

This article is excerpted from a new white paper, *Global Warming Is Here: The Scientific Evidence*, available from Climate Solutions, 610 E. 4th St., Olympia WA 98501, USA, phone (360) 352-1763, info@climatesolutions.org

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